Ying Yuan

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EDUCATION

University of Michigan – Ann Arbor, MI Aug 2021 – May 2023 (Expected)
M.S. *in Computer Science and Engineering*; GPA: 4.00/4.00

Purdue University – West Lafayette, IN Jan 2019 – May 2021
B.S. *in Computer Science*; GPA: 3.94/4.00;
Major GPA: 3.95/4.00
Minor in Statistics; Minor GPA: 4.00/4.00
Honor: Graduated with distinction; Dean's List & Semester Honors for all 5 semesters

Illinois Institute of Technology – Chicago, IL Aug 2016 – Dec 2018
Major: Computer Science; GPA: 3.80/4.00
Honor: Dean's List for 4 semesters

PUBLICATIONS AND PATENTS

- **Yuan, Ying.**, Yuan, Bin., & Mao, Hanqiu. "Performance of Existing Predictor of SubCellular Localization of Long Non-Coding RNA on the New Database." *Proceedings of the 2020 9th International Conference on Computing and Pattern Recognition*. 2020.
- **Yuan, Ying.** 2017. Method and device of rapidly measuring total number of colonies in water based on concentration counting. China. ZL 2014 1 0719339.7, filed December 02, 2014, and issued July 04, 2017.
- Liu, Xingzhao., **Yuan, Ying.**, Gao, Yesheng., & Yuan, Bin. 2022. Image processing method of synergistic photo-electrochemical Synthetic Aperture Radar (SAR) based on Overlapped Subaperture Algorithm. China. CN201910773690.7, filed August 21, 2019, and issued July 15, 2022.
- Huang, Junqing., & **Yuan, Ying**. 2022. Electromagnetic wave-based grouting sleeve fullness detection method. China. CN201911167671.6, filed November 25, 2019, and issued May 02, 2022.
- Huang, Junqing., **Yuan, Ying.**, & Yuan, Bin. 2012. Shorted Patch Anti-metal Yagi-Uda Antenna and RFID. China. ZL 2008 1 0041251.9(CN200810041251.9), filed July 31, 2008, and issued Apr 25, 2012.

RESEARCH EXPERIENCE

Argument Quality Assessment in Argument Mining | NLP Ann Arbor, MI
Research Assistant **Jan – May 2022**
Advisor: Dr. Lu Wang, Professor at University of Michigan
- Composed literature review on hundreds of papers in academia about argument mining, argument quality assessment, and existing theory and corpus in Natural Language Processing (NLP) area;
- Visualized and Conducted analysis on five corpora for argument structure and argument quality investigation tasks;
- Implemented a sequence pair classification model using RoBERTa as baseline model; implemented a context-aware Transformer-based argument structure prediction model; evaluated and compared two models.

Mobile Scanning App Realization Using GANs | CV Remote Work
Research Assistant **July – Aug 2021**
Advisor: Dr. Kai Chen, Professor at SJTU & Director of the Joint Laboratory for Artificial Intelligence
- Conducted technical-market research by investigating hundreds of commercially and technically related articles and patents about launched mobile scanning applications;
- Investigated references focusing on the geometry correction and optimization techniques for scanned documents;
- Proposed a new Generative Adversarial Network utilizing U-Net and Fully Convolutional Network.

Sub-Cellular Localization of Long Non-Coding RNA | Deep Learning West Lafayette, IN
Research Assistant **Jan – Jul 2020**
Advisor: Dr. Xiaoqian Wang, Assistant Professor at Purdue University
- Created benchmark dataset by collecting and screening lncRNA data using Python from RNALocate; obtained over 7,000 corresponding nucleic acid sequences using beautifulSoup crawler and BioPython;
- Implemented and evaluated machine learning baseline models including SVM, logistic regression, and XGBoost, using extracted k-mer features with bioinformatics significance from nucleic acid sequences;
- Proposed new hybrid learning methods with adaptive weights for extremely imbalanced datasets that outperform previous baseline on minority class with 10% higher weighted F1 score;
- Combined adaptive weights, built, and trained models, including Siamese network, BiLSTM, CNN, and other supervised learning; evaluated models' performance under different combinations; improved accuracy by 7%.

Monocular-vision-based Hawk-Eye System for Tennis | CV Shanghai, China
Research Assistant **Aug – Sep 2020**
Advisor: Dr. Kai Chen, Professor at SJTU & Director of the Joint Laboratory for Artificial Intelligence

- Conducted technical-market research by investigating multiple Hawk-Eye related companies, articles, and patents;
- Proposed a new tennis amateur-friendly Hawk-Eye computer vision system based on monocular vision;
- Developed system to a millimeter accuracy using OpenCV with Python; detected tennis ball and court line to help line calls, predicted drop point with group members.

PROJECT EXPERIENCE

Abdominal Medical Images Segmentation with CNN-Transformer Hybrid Model | Deep Learning, CV
Group Project **Jan – Apr 2022**

- To solve failure in small and direction-dependent objects detection, and problem of fragmental edges in generated segmented objects, proposed two novel hybrid models, UT-Fuse and Swin-Fuse, for medical image segmentation;
- Implemented novel hybrid models by fusing representations from parallel CNN and Transformer branches;
- Reimplemented TransFuse, ResUNet, TransUNet, SwinUNet, and UTNet as baseline models on Synpase Multi-organ dataset for comparison;
- UT-Fuse and Swin-Fuse outperform almost all other models in mean DICE score and mean HD95, and have stronger capability of restoring edges in generated segmented objects;
- UT-Fuse is able to detect small and direction-dependent objects compared to other Transformer-based models.

Model-based RL with DDPG for Arbitrarily Positional Grasp | Deep Reinforcement Learning
Group Project **Jan – Apr 2022**

- To solve the allocation problem of computational resources due to high-dimensional continuous space and sparsely sampled data, proposed and implemented a novel reinforcement learning algorithm, Model-based MPC RL with DDPG, for arbitrarily positional reaching;
- Implemented DDPG and TD3 variants as model-free only baseline algorithm for comparison;
- Novel algorithm outperforms baseline with improved training stability and faster convergence with higher rewards;
- Proposed a new advanced version of our model-based RL algorithm, Model-based MPPI RL with DDPG and HER, to apply the model-based RL with the model-free algorithm in the real-time and real-world online learning.

Automatic Abstractive Long-Span Document Summarization | Deep Learning, NLP
Group Project **Dec – Dec 2021**

- Proposed and implemented a novel BART-based model utilizing Longformer self-attention to reduce the complexity of Transformer model to linear and maintain full sequence representation;
- To solve heavy memory usage and compute requirements, adopted explicit Multitask Content Selection for inference-time content selection;
- Implemented models by modifying full self-attention of BART with different attention patterns, including local self-attention and sparse self-attention, for comparison;
- BART with Longformer self-attention achieves higher ROUGE-1 and ROUGE-2 score than BART with other attention patterns.

Transformer Model for Enhancing MirrorGAN-Based Text-to-Image Generation | Deep Learning, CV
Group Project **Oct – Dec 2021**

- Proposed a novel Transformer-and-GAN-based model for better Text-to-Image quality;
- Reproduced AttnGAN and MirrorGAN as baseline models;
- Adopted and implemented Fréchet Inception Distance as a new metric and other common metrics for this task;
- Implemented the novel model by modifying the text-encoder of MirrorGAN with pretrained BERT model;
- Compared the results qualitatively and quantitatively; comparison results shows that the novel model improves the diversity of generated images and requires less training time.

Duetifier | Database, SQL, PHP
Independent Project **Mar – Apr 2021**

- Programmed in JavaScript, CSS, PHP, and SQL to implement reminder web application designed for college assignments that allows students to track each task by the importance corresponding to the course grading policy;
- Deployed Duetifier, including the database and the code, to the App Engine on Google Cloud Platform.

Neural Style Transfer Using Deep Learning | Deep Learning, CV
Independent Project **Oct – Dec 2020**

- Programmed in Python to implement Neural style transfer taking two images or audio files and generating a single image or audio file in the style of another image or audio file;
- Implemented Neural style transfer with lower-level Keras API; utilized CNNs to build patterns hierarchically to determine style from image/audio spectrum.

WORK EXPERIENCE

Apple Inc. Cupertino, CA

Triage Automation Intern | Deep Learning, NLP **May – Aug 2022**

- Designed, implemented, and deployed a customizable, modular, and sustainable system that applies machine learning and natural language processing for bug triage automation.
- Implemented and evaluated supervised and unsupervised machine learning models, using vector representation of text data extracted by natural language processing techniques including Transformer;
- To ensure model reliability and to adapt to changes in real-world data over time, investigated techniques and metrics for monitoring performance of models in production and drifts in data;
- Filed patent application for this bug triage automation system.

Shanghai Shenyao Intelligent Technology Co., Ltd. Shanghai, China

Algorithm Research Intern | Machine Learning **Jun – Aug 2020**

Project 1: Research on Applications of Data Mining and Machine Learning for iCkey

- Collaborated with members to collect and investigate over 400 commercially and technically related articles, patents, and websites;
- Analyzed technical feasibility, possible benefits, and applicability of existing applications of data mining and machine learning for B2B to iCkey, the e-commerce for Electronics Manufacturing Services (EMS);
- Proposed new application for data mining and machine learning that self-constructed knowledge graphs for EMS and Electronic Engineering (EE);
- Delivered technical-market research report and the new application proposal to iCkey.

Project 2: Demonstration of the Intelligence System

- Designed pragmatic structure of an intelligence system focusing on Question Answering System (QAS) and optimized BOM auto-generation based on the products;
- Collected professional knowledge, datasets on electronic components, and existing BOM about industrial robots to train the intelligence system;
- Constructed a QAS with anyQ open-source API and used Axure RP to create a prototype with intelligence system specifications to demonstrate applications and possible user experience to iCkey.

Changshu Kaixi EE Co., LTD. Changshu, China

Technical Assistant **May – Aug 2018**

- Classified and analyzed database; designed graphic for company accessories;
- Collaborated with other staff members to reinforce pulse source products;
- Applied for five national invention and utility model patents.

Illinois Institute of Technology Chicago, IL

Peer ARC Scholar **Aug – Dec 2018**

- Tutored undergraduate students in subjects, including Math, Physics and Computer Science, to improve their study skills and academic performance;
- Provided peer advising and academic experience to undergraduate students on academic plans.

SKILLS

Languages:

- Python, Java, C, C++
- TensorFlow, Keras, Pytorch
- SQL, Neo4J, MongoDB
- R, SAS, MATLAB, Mathematica
- x86 assembly, ARM assembly
- Lex, Yacc, Bash Script

Mathematics & Statistics:

- Calculus, Differential Equations
- Linear Algebra; Abstract Real Algebraic Linear Algebra
- Probability and Statistics, Statistical Theory
- Applied Regression Analysis, Design of Experiment

Computer Science:

- Computer Architecture, Systems Programming
- Computer Networks
- Data Structures, Analysis Algorithm
- Database Organization, Information Systems
- Numerical Methods
- Data Mining, Machine Learning
- Artificial Intelligence
- Computer Vision, Natural Language Processing
- Reinforcement Learning